

ARCTIC GRAYLING RECOVERY PROGRAM ANNUAL MEETING NOTES
TUESDAY, MARCH 1, 2011
C'MON INN, GALLATIN CONFERENCE ROOM
6139 E. VALLEY CENTER ROAD
BOZEMAN MONTANA

WELCOME, INTRODUCTIONS, AND GRAYLING STATUS – TRAVIS HORTON, FWP

Travis Horton, Montana Fish, Wildlife and Parks (FWP) reviewed the ESA listing history for Arctic grayling. The most recent event (U.S. Fish and Wildlife Service (USFWS) decision notice December 2010) concluded that Arctic grayling in the Upper Missouri River Basin are warranted for protection under Endangered Species Act (ESA), but precluded at that time due to higher priority species. For more information, contact the USFWS in Helena Montana at 406-449-5225.

CENTENNIAL VALLEY SESSION

9:15 Centennial Valley Grayling Conservation – Matt Jaeger, FWP

Agencies and Non-government Organizations (NGO's) with either Arctic grayling population or land management authority and responsibility in the Centennial Valley convened a two-day planning meeting in early 2011. The primary goals were to develop 1) common long-term management goals and 2) a 2011 workplan such that our recovery actions and monitoring will relate directly back to our management goals. *Monitoring for conservation* (Nichols and Williams 2006) was used as an example of how management goals, management actions, hypothesis formulation, and monitoring should be hierarchically nested. To better formulate goals we presented and discussed the current state of knowledge of Arctic grayling populations and their limiting factors in the Centennial Valley as well as restoration efforts that were already underway. The following overarching management goals and specific workplan items were developed for fisheries issues in the Centennial Valley:

- 1) Conserve existing Red Rock Arctic grayling genetic diversity
 - A. Assess present population to determine:
 - 1) presence of genetic structuring throughout drainage
 - 2) effective population
 - B. Establish a genetic reserve brood population in Elk Lake.
- 2) Establish or maintain Arctic grayling spawning and/or refugia in two tributaries in each habitat segment and connectivity among segments
 - A. Restore or maintain habitats on Red Rock Creek
 - B. Restore connectivity and habitat on Elk Springs Creek
 - C. Assess present status and restoration potential of formerly occupied tributaries
 - D. Assessment of present connectivity among segments
 - E. Restore connectivity and habitat on Long Creek
- 3) Increase suitable conditions for Arctic grayling in Upper Red Rock Lake
 - A. Assess present lake bathymetry to determine habitat availability and restoration potential
 - B. Conduct infra-red flight to determine habitat availability and restoration potential

- C. Develop a list of viable restoration alternatives (i.e., periodic dredging, prevent heightened erosion, reduction of non-native trout via angling or suppression, etc.)
 - D. Determine present overwinter conditions in lakes and tributaries
- 4) Protect and secure all conservation populations of westslope cutthroat trout
 - A. Determine genetic status of conservation populations
 - B. Determine isolating mechanism for conservation populations
 - 5) Create genetically unaltered meta-populations of westslope cutthroat trout in two stream systems
 - A. Assess restoration potential in O'Dell, West Corral, and Clover creeks

An assessment and evaluation of monitoring needs and programs will occur in subsequent meetings to ensure that 1) monitoring is directly responsive to management goals and decisions and 2) that monitoring is developed in a manner that tests competing hypotheses regarding system state.

9:40 Elk Springs Conservation Project – Glenn Boltz, USFWS

USFWS planning document called a Comprehensive Conservation Plan was finalized in 2009 for Red Rock Lakes National Wildlife Refuge; which will guide management efforts on the refuge over the next 15 years. Objectives and their corresponding strategies designed to accomplish the plan's conservation goals for native fishes, focus on maintaining or restoring the biological integrity and diversity of the area.

One such effort is to reconnect headwater reaches of Elk Springs Creek to the rest of the system, thereby providing access to historical spawning sites by lake dwelling Arctic grayling not currently available. Work began in 2009 in returning this area to a free flowing stream by removing barriers that created an artificial impoundment. Progress to date has created a defined stream channel within the impoundment and plans call for replacing the remaining barrier with a structure more friendly to fish passage during 2011. In conjunction with stream restoration, effort to reestablish a grayling spawning run began in 2010 by incubated grayling eggs using stream-side remote stream incubators (RSIs). Results indicated a high percentage of swim up fry survived from the initial number of eggs incubated in both Elk Springs Creek (77%) and in Red Rock Creek (95%), where we sought to mitigate negative impacts our egg collection may have had on the sole remaining natural spawning run of grayling from Upper Red Rock Lake. Plans call for continuing this effort over the next several years to create a multiple year class spawning run similar to what existed historically in this stream.

10:05 Hell Roaring Creek Project– Scott Gillilan, Gillilan & Associates

Hell Roaring Creek is a tributary to Red Rock Creek, the primary spawning tributary for the Red Rock Grayling population. Hell Roaring Creek has been impacted by changes in flow patterns, land use practices and the decline in beaver activity. Much of the stream energy has been funnel into one channel, that in combination with poor riparian vegetation and eroding banks have dramatically increase sediment loads in Hell Roaring Creek. A partnership between The Nature Conservancy (TNC), USFWS, and FWP fueled a habitat restoration project that involved addressing extremely dynamic flood hydrology, an active alluvial fan, variable channel types, channel instability, and degradation. The upper alluvial fan involves flood discharges concentrated into east channel and flow routing affected by berming at apex and Red Rock Road acting as a levee. The mid fan showed the channel enlarging due to concentrated flood flows in dominant channel; significant bankline erosion that is evolving to an inset C-channel with incipient floodplain formation.

Geomorphic and hydrologic data was collected between 2006 and 2009 and final design completed in 2010. Restoration objectives were to restore flood hydrology – reconnect/activate distributary channels

below road; reduce sediment load to Red Rock Creek by stabilizing banklines; and implement annual willow plantings to improve bank vegetation stability. Project implementation began in 2010 and will be continued in 2011. Restoration work completed in 2010 improved bank stability dramatically and held together quiet well through a high water runoff event. In 2011, restoration will continue with efforts directed at dissipating runoff into multiple channels and improving riparian conditions. Future efforts should evaluate conditions through the butterfly bends and investigate Red Rock Creek sediment balance, and impacts to Red Rock Lake.

10:45 Narrows Creek – Jim Magee, FWP

Narrows Creek is a tributary to Elk Lake located on the Beaverhead-Deerlodge National Forest in the Centennial Valley in southwest Montana. Narrows Creek historically supported a spawning run of native Arctic grayling and cutthroat trout population inhabiting Elk Lake. In the early 1990's the stream went dry approximately 0.6 miles upstream of Elk Lake. The stream now flows subsurface in this reach with springs emerging at the mouth adjacent to Elk Lake. Reasons for the change in stream flow are most likely attributed to climatic change and seismic activity. Because Narrows Creek was the only spawning tributary for Arctic grayling and cutthroat trout in Elk Lake, natural reproduction ceased, Arctic grayling became extinct, and cutthroat trout by necessity were supplemented through stocking. Since 2002, westslope cutthroat trout, the native cutthroat to Elk Lake are annually stocked by FWP. Reestablishing a spawning stream will be necessary to reestablish self-sustaining population of Arctic grayling in Elk Lake, which was one of only a few native populations of adfluvial (lake dwelling-river spawning) grayling in Montana. Reestablishing a spawning tributary for westslope cutthroat trout may potentially create a self-sustaining population and eliminate the need to stock. Both species are classified as "Species of Concern" by the U.S. Forest Service (USFS) and a "Species of Special Concern" by FWPs. FWP would like to not only establish a self-sustaining population of Arctic grayling but also to use this population as a genetic brood for the Red Rock Arctic grayling population. Establishing a genetic diverse brood for the Red rock population may be used to 1) establish new populations, 2) if needed augment natural reproduction and 3) worst case scenario reestablish Red Rock Arctic grayling population. Arctic grayling gametes will be collected from the Red Rock population over a period of 3-4 years and placed in remote system incubators in Narrows's spring creek to establish the brood in Elk Lake. This brood would enhance opportunity to establish additional population of adfluvial grayling into historic waters. In 2011, FWP plans to implement a project that will pipe flows from Narrows Creek at the point it flows underground to a springs located approximately 0.3 kilometers upstream from Elk lake. The current spring creek channel will be enhanced to create spawning habitat. The project goal is to secure 1.2-2.0 cfs for 5 five weeks.

11:05 Long Creek Projects – Nathan Korb, TNC

In 2010, TNC rested the 1200ac Long Creek tract and left irrigation water in-stream for the first time in probably many years. We planted approximately 900 dormant will stems in May and 170 mature willow clumps in October along different treatment reaches developed specifically for learning (see map). Volunteers, staff, partners, and contractors helped initiate the monitoring program along the four miles of Long Creek that run through the property. Monitoring included photo-documentation (TNC), riparian surveys (FWP), fish sampling (FWP), two discharge stations (FWP and TNC), bird point counts (TNC), bird inventory (USFWS), crane and curlew surveys (TNC and USFWS), eight permanent cross-sections (TNC), three groundwater monitoring wells (TNC), and one peizometer (TNC). Other projects included the removal and restoration of a problematic culvert crossing, the removal of approximately 2.5 miles of interior fences, the replacement of 2.5 miles of boundary fence with wildlife-friendly fence, the control of invasive plants (Whitetop), and the removal of the only residential structure on the property. In

2011, we intend to work with neighbors to improve irrigation management and perhaps reconstruct irrigation structures.

REINTRODUCTIONS SESSION

12:45 Yellowstone National Park Conservation – Todd Koel, YNP

Yellowstone National Park (YNP) is completing an environmental compliance [National Environmental Policy Act (NEPA)] process for implementation of a native fish conservation plan. Within this parkwide plan there are two projects identified that would benefit fluvial Arctic grayling. These projects would occur within Grayling Creek and the upper Gibbon River in the coming years. However, given the immediate urgency within Yellowstone to save the cutthroat trout of Yellowstone Lake, to be successful the efforts to restore Arctic grayling will require a great amount of in-kind support by partners.

1:05 Rock Creek & Ruby River – Jim Magee, FWP

Rock Creek is a historically important tributary for Arctic grayling in the Big Hole drainage. In the early 1990s the channel of Rock Creek was manipulated so that Rock Creek drained into a irrigation diversion thus disconnecting the stream from the Big Hole River. In 2006, a project was completed that reconnected Rock Creek to the Big Hole River and enhanced 2.5 miles stream habitat, installed a riparian fence and improved irrigation infrastructure. Since 2006, FWP has annually monitored Rock Creek to evaluate the fisheries response after the project was completed. From 2007 -2009 only one grayling was captured moving into Rock Creek. In 2010, FWP used RSIs to supplement Arctic Grayling into Rock Creek with the goal of establishing multiple year classes that would potentially spawn in Rock Creek. Gametes were collected from the Arctic grayling fluvial brood stock that originated from the Big Hole River population and is located in the Axolotl Chain of lakes. Eggs were “eyed” and then transplanted to Rock Creek and placed in RSIs located at three sites. On May 28, 2010 approximately 80,000 eggs were placed in 21 RSIs. Fry emerged from RSI from June 3-June 17. Fall electrofishing surveys captured 401 grayling that were produced from the RSIs. These efforts will be continued in 2011.

The Ruby River was historically home to fluvial Arctic grayling but grayling were extirpated from the Ruby River drainage by the mid 1900s. FWP began an effort to reestablish a population of Arctic grayling in 1997. Hatchery reared grayling from the fluvial grayling brood stock were planted into the upper Ruby River upstream of the Ruby Reservoir from 1997 -2005. Planted grayling suffered high mortality but did reproduce in 2001. From 2005-2008, Remote Stream Incubators were used to supplement the upper Ruby River with the goal of establish multiple year classes representative of a wild population. By 2009, numerous age classes were established and no supplementation of Arctic grayling occurred in the upper Ruby River. Fall electrofishing surveys capture five different age classes of Arctic grayling including young-of the year (YOY) grayling that were reproduced naturally in the Ruby River drainage. In 2010, YOY were again captured indicating successful reproduction occurred for the second consecutive year. Recruitment of juvenile grayling into mature reproducing individual will be evaluated over time to determine if a viable population has been established.

BIG HOLE RIVER SESSION

1:35 CCAA and Site Plans – Lora Tennant, FWP

The Candidate Conservation Agreement with Assurances (CCAA) program establishes an agreement between the USFWS and non-federal landowners to protect species that are in danger of becoming listed as ‘threatened’ or ‘endangered’ under the ESA. Non-federal (including state and private)

landowners that enroll in the CCAA program agree to remove threats to an imperiled species on their property in exchange for protection from future regulations if that imperiled species is listed under the ESA. The fluvial Arctic grayling in the Upper Big Hole River watershed is a species that is enrolled in the CCAA program. Currently, there are 33 landowners and 158,242 acres of private and leased (state and federal) land enrolled in the Arctic grayling CCAA program in the Upper Big Hole River watershed. These landowners are working closely with representatives from FWP, USFWS, the Montana Department of Natural Resources (DNRC), and the Natural Resources Conservation Service (NRCS) to develop site-specific plans for Arctic grayling for each landowner's property. These site-specific plans will address threats to Arctic grayling on the enrolled land by 1) improving streamflows, 2) improving and protecting riparian habitats, 3) reducing or eliminating entrainment threats, and 4) removing migration barriers. Currently, six of the 33 landowners have site-specific plans in place on their enrolled lands accounting for approximately 16% of the land enrolled in the CCAA program. However, three site-specific plans are in the final stages of completion and once complete will increase the amount of enrolled land with a site-specific plan to about 47%. Additionally, several site-specific plans have working drafts that are being addressed.

1:55 In-stream Flow – Mike Roberts, DNRC

DNRC provided technical assistance in 2010 towards the implementation of the fluvial Arctic grayling Candidate CCAA in the upper Big Hole River basin in southwest Montana. The DNRC's continued efforts included the development and negotiation of Site Specific Plan flow management strategies with participating landowners, streamflow monitoring, and water rights technical support. Following a marginal snowpack year, the upper Big Hole received nearly 7.5 inches of precipitation in May and June which resulted in above average streamflows that ranked in the top 25% volumetrically for the Wisdom gage period of record (75 percentile). Cooler than average temperatures in mid-May resulted in a slow snowpack release that coincided with some irrigation diversion. Spring flow targets were not met for a few days in Management Segments B, D, and E, and for several weeks in Segments A and C. Irrigators, including those with signed site plans released 62 cfs into the river in May to alleviate low flow conditions. Summer flow targets were met in most of the Management segments with the exception of 7 days in Segment A and 21 days in Segment C. Another 19 cfs (for a season total of 81 cfs) was contributed by landowners during low flow periods in the summer.

Additional work conducted but DNRC included the commencement of a forage production study and intensive instream flow management in Rock Creek. DNRC's primary focus in 2011 will be the continued negotiation and implementation of flow management plans with participating landowners.

2:20 Riparian Conservation – Emma Cayer, FWP

In 2010, we completed 4.5 miles of riparian fence, and reviewed 2 stream restoration designs, one for a 6 mile reach of the North Fork, and the other for a 1.6 miles reach of Big Lake Creek. We planted 7,400 willows on restoration projects, and treated over 1,860 acres for noxious weeds. We also completed 11 irrigation improvement projects, and 3 stock watering systems. If all the 2010 projects are divided out in to their associated CCAA segments, segment C had the least amount of total projects completed last year. Segment D had the most projects completed; however, the riparian assessment results showed that across the CCAA project area, segment D had the poorest overall riparian habitat. Looking at projects completed to date, we have planted over 60,000 willows, and completed 17 stream restoration projects, 94 miles of riparian fence, 77 irrigation improvement projects, 51 stock watering systems, 20 fish ladders, 65 headgates, and 2 feedlot restorations. We have done more irrigation/water management projects than any other type, and have spread the projects out evenly in terms of CCAA segments. Even though we only have 6 signed site plans, we have seen dramatic changes in riparian areas on property without signed site plans due to implemented projects and landowner initiative.

3:00 NRCS Effect – Kyle Tackett, NRCS

NRCS work in the CCAA area included:

- Diversions - 32
- Headgates - 46
- Fishladders - 17
- Flumes - 34
- Stock Wells - 2
- Troughs - 9
- Stockwater Pipeline - 7000'
- Stream Restoration - 3300'
- AFO/CAFO Relocation - 1
- Fence - 2 miles

3:25 Restoration Projects / Fish Response – Austin McCullough, FWP

Habitat enhancement projects targeting Arctic grayling conservation in the Big Hole watershed has been implemented using a variety of restoration treatments. Active restoration, vegetation enhancement and livestock management, typically by fencing the riparian corridor, have been used either solely or in combination to promote overall health and function of stream reaches. An example of a project implemented in the Big Hole using each type of restoration treatment and the associated grayling population response was presented.

The Steel Creek restoration project was implemented in 2004 to enhance a 1.9-mile stream reach that historically held relatively high numbers of both juvenile and adult grayling. Restoration treatments included transplanting willows to stabilize excessively eroding stream banks and promote the establishment of functioning riparian vegetation (vegetation enhancement). A riparian fence was also constructed around the stream reach. Post-project data illustrates a positive response from both the riparian vegetation composition and the stream channel geometry within the project reach. Electrofishing surveys (2005 – 2009) have documented a positive response from both juvenile and adult grayling, as well as sympatric species inhabiting the reach.

The Deep Creek project consisted of constructing 0.9-miles of riparian fence to exclude livestock from impacting a 1.1-mile reach of Deep Creek (livestock management). Prior to project implementation, electrofishing surveys showed a negative trend in grayling utilization within the reach (1988 – 2007). Since completion, electrofishing surveys have documented a positive response from juvenile and adult grayling (2008 – 2010); however, more data is needed to understand the long-term benefits of the project. The Swamp Creek Restoration project was implemented in 2009 and addressed a 6.75-mile reach of the stream. A riparian fence was constructed to protect the reach from livestock impacts and healthy riparian vegetation composition was promoted by importing willow and sod transplants. A 0.5-mile reach of Swamp Creek was also relocated into a historic channel signature and served as the focal point for this portion of the presentation (active restoration). In 2009, an electrofishing survey was conducted within the reach prior to the channel relocation. The survey resulted in the capture of a high abundance of brook trout (160/mile) and only one grayling. The relocated channel was again surveyed in 2010 resulting in the capture of five grayling and a reduced density of brook trout (44/mile). The relocated channel provided immediate benefits to grayling; however, more data is needed to understand the long-term benefits of the project.

The habitat enhancement projects presented offer justification for the using active restoration, vegetation enhancement and/or livestock management treatments to improve conditions for grayling in the upper Big Hole. Electrofishing efforts since the inception of the CCAA in 2006 document a positive

trend for the number of grayling captured per mile annually (2006 – 2010) indicating the programs conservation actions are benefitting the grayling population.

3:40 Big Hole Fisheries Movement and Temperature Dynamics – Shane Vatland, MSU

Climate in the western United States is expected to become warmer and more variable during the next century, and concurrent demands for watershed resources are expected to increase. Accordingly, understanding how changes to broad-scale factors (such as climate) and local-scale factors (such as land use) affect local aquatic ecosystems has become a fundamental concern for fisheries ecologists and managers. In addition, fragmented populations of coldwater fish (such as fluvial Arctic grayling in southwestern Montana) may be particularly vulnerable to changes in thermal habitat. In this presentation, we discuss the potential effects climate change may have on suitable thermal habitat for fluvial Arctic grayling in the Big Hole River watershed. Past climate and stream monitoring data were collected to assess trends in summer air temperature, stream discharge, and stream temperature. To evaluate the present extent of suitable thermal habitat, stream temperatures were surveyed with a combination of remote sensing (thermal infrared-TIR), continuous longitudinal temperature profiling, and fixed-station water temperature loggers. Using this combination of data, we characterized the distribution of thermally suitable habitat during the summer and identified associated habitat attributes (e.g., riparian vegetation, channel morphology, and discharge). Suitable thermal habitat was patchily distributed throughout the study area, and cold-water tributaries likely provide critical cold-water thermal refugia. These spatially and temporally explicit thermal data were incorporated into statistical stream temperature models, and future changes in thermal habitat were assessed based on regional climate change predictions. Under scenarios of increasing and more variable summer air temperatures, we predicted a significant increase in the occurrence of stream temperatures that exceed chronic and acute thermal tolerance thresholds for Arctic grayling. We are currently evaluating spatial patterns in observed and predicted stream temperatures to identify areas critical to maintaining suitable coldwater habitat in the future.